

MOSFET With Decoupled Halo Before Extension

Abstract

An inverse-T transistor is formed by a method that decouples the halo implant, the deep S/D implant and the extension implant, so that the threshold voltage can be set by adjusting the halo implant without being affected by changes to the extension implant that are intended to alter the series resistance of the device. Formation of the inverse-T structure can be made by a damascene method in which a temporary layer deposited over the layer that will form the cross bar of the T has an aperture formed in it to hold the gate electrode, the aperture being lined with vertical sidewalls that provide space for the ledges that form the T. Another method of gate electrode formation starts with a layer of poly, forms a block for the gate electrode, covers the horizontal surfaces outside the gate with an etch-resistant material and etches horizontally to remove material above the cross bars on the T, the cross bars being protected by the etch resistant material.